

## Part-1. Oceanographic and Marine Meteorological Observations on board Research Vessels

### Explanation of File Format

- Oceanographic observation data are stored on the CD-ROM in the following seven files:

1. Hydrographic data (file name: **xxyyymm.E**)
2. Subsurface temperature data (**xxyyymm.T**)
3. Subsurface current data (**xxyyymm.A**)
4. Plankton data (**xxyyymm.tp**)
5. CTD data (**xxnnnnn\_1.ctd**)
6. XCTD data (**xxnnnnn.xct**)
7. BT data (**xxbb111.bt**)

where, **xx**: Ship Code [listed in Table 1]  
**bb**: Ship Code for BT data [listed in Table 1]  
**yy**: Year (last 2 digits)  
**mm**: Month  
**tp**: Type of Plankton [ZP: zooplankton, PP: phytoplankton]  
**nnnn**: Station number (4 digits)  
**111**: Station number (3 digits) for BT data

Hydrographic data, Subsurface temperature data, Subsurface current data and Plankton data consist of ASCII records of fixed lengths (126 bytes except Plankton data [73 bytes]). Each record is separated by two characters like as in DOS, which characters are one “control M” (carriage return, ASCII code 0Dh) and one “control J” (line feed, ASCII code 0Ah). For a missing value, the character ‘-’ (ASCII code 2Dh) is put in place of the measured value. The column of the element that was not observed is filled with blanks.

CTD, XCTD and BT data files consist of ASCII records of variable length. Each element is separated by the character ‘,’ (comma, ASCII code 2Ch), and the column of the element that was not observed is filled with ‘-9’.

- Marine meteorological observation (Maritime meteorological observation and Aerological observation) data are stored on the CD-ROM in the following two files:

1. Maritime meteorological data (**DDDDYYYY.im1**)
2. Aerological data (**yymmdd.aer**)

where, **DDDD**: Ship call sign [listed in Table 1]  
**YYYY**: Year (4 digits)  
**yy**: Year (last 2 digits)  
**mm**: Month  
**dd**: Day

Maritime meteorological data consist of ASCII records of fixed lengths (131 bytes). Aerological data consist of ASCII records of variable length.

## 1 Hydrographic data

Hydrographic data consist of 4 types of records: HEADER-1, HEADER-2, HEADER-3 and DATA. HEADER-1 represents cruise information. HEADER-2 and HEADER-3 represent station information and remarks, respectively. DATA includes observation data at the station.

The data files are composed of HEADER-1 and station data groups. HEADER-1 is always located at the beginning of the file. The station data groups are composed of HEADER-2, HEADER-3 and DATA. The character '@' on the "REC\_IND" of DATA represents the end record of the station data group.

HEADER-1 (Cruise Information)			
Element	Start Position	Field Type	Description of Field
FORMAT CODE	1	A4	Format code of the file: 'E2.1'
CRUISE NO	6	I4	Cruise number identified with the year and the month.
PERIOD	11	2(2I2,1X)	Date of beginning and end of the CTD and XCTD observations.
AREA	21	A98	Observation area.
NO OF STN	119	I4	Number of stations.
SHIP CODE	124	A2	Ship Code (listed in Table 1.)
REC_IND	126	A1	'@'

HEADER-2 (Station Information)			
Element	Start Position	Field Type	Description of Field
STATION NO	1	A3,I4	Station number given by the ship code suffixed with four digits consecutive numbers.
LATITUDE	9	I2,1X,I2,I1,A1	Degrees, minutes and tenths of minutes (if given) of latitude, N or S.
LONGITUDE	17	I3,1X,I2,I1,A1	Degrees, minutes and tenths of minutes (if given) of longitude, E or W.
DATE/TIME	26	2(I2,1X,I2,1X,2I2,1X)	Month, day and time of beginning and end of a hydrographic cast in the Japan Standard Time (JST), which is nine hours ahead of the coordinated Universal Time (UTC).
W-DEPTH	48	I4	Water depth to the bottom in meters.
W-COLOR	54	I2	Color of sea in Forel-Ure scale.
TRANS	57	I2,1X,I2,1X	Transparency in meters with wire angle in parentheses, as determined by Secchi Disk.
SSF-NO	102	A3,I3	Corresponding station number of the subsurface temperature data.
ACM-NO	109	A3,I3	Corresponding station number of the subsurface current data.
SUB STN NO	116	A6	Sub station number.
CRUISE NO	122	I4	
REC_IND	126	A1	'='

HEADER-3 (Station Remarks)

Element	Start Position	Field Type	Description of Field
STATION NO	1	A3,I4	
REMARKS	9	A82	Remarks of the station.
PARAM INF	91	A35	Information of additional parameters in "DATA".
REC_IND	126	A1	'='

DATA (Observation Data)

Element	Start Position	Field Type	Description of Field
STATION NO	1	A3,I4	
TIME	9	2I2	Sampling time in JST.
DEPTH(OBS)	17	I4	Depth of sampling in meters.
TEMP(OBS)	22	F5.2	CTD temperature in "the International Temperature Scale of 1990 (ITS-90)."
SAL(OBS)	28	F6.3	CTD salinity in "the practical salinity scale, 1978 (PSS-78)."
DO	35	I3	Concentration of dissolved oxygen in micro mol per liter as determined by the Winkler Method.
PO4-P	39	F4.2	Inorganic phosphate-phosphorus in micro mol per liter as determined by the reduction method using ascorbic acid (STRICKLAND AND PARSONS, 1965).
T-P	44	F4.2	Total phosphorus in micro mol per liter as determined using the potassium persulfate decomposition method.
NO3-N	49	F4.1	(Nitrate+nitrite)-nitrogen in micro mol per liter as determined by the Muellin-Riley method using copper-cadmium reduction column (WOOD, ARMSTRONG AND RICHARD, 1967).
NO2-N	54	F4.2	Nitrite-nitrogen in micro mol per liter as determined by the Bendschneider and Robinson method (STRICKLAND AND PARSONS, 1965).
NH3-N	59	F4.2	Ammonia-nitrogen in micro mol per liter as determined by the modified indophenol method.
PH	64	F4.2	Hydrogen-ion concentration at 25 degrees centigrade as determined by the pH meter.
CHL	69	F6.2	Chlorophyll a in micrograms per liter as determined by the fluorometric technique.
PHA	76	F6.2	Phaeopigments in micrograms per liter as determined by the fluorometric technique.
(ADD PARAM)	83		(Additional parameter.)
DEPTH(STD)	94	I4	Standard depths in meters.
TEMP(STD)	99	F5.2	CTD temperature in ITS-90.
SAL(STD)	105	F6.3	CTD salinity in PSS-78.

Element	Start Position	Field Type	Description of Field
D-ST	116	I4	Thermosteric anomaly in $10^8 \text{m}^3/\text{kg}$ .
DELTA-D	121	F5.3	Geopotential anomaly in $10 \text{m}^2/\text{sec}^2$ .
REC_IND	126	A1	'@' (End Record of station) or '='

## 2 Subsurface temperature data

Subsurface temperature data consist of cruise information record (HEADER) and subsurface temperature data records (DATA) obtained during the cruise. The "REC\_IND" field definition is the same as one in the hydrographic data.

### HEADER (Cruise Information)

Element	Start Position	Field Type	Description of Field
FORMAT CODE	1	A4	Format code of the file: 'T1.2'
CRUISE NO	6	I4	Cruise number identified with the year and the month.
PERIOD	11	2(2I2,1X)	Date of beginning and end of the subsurface temperature observations.
AREA	21	A98	Observation area.
NO OF STN	119	I4	Number of stations.
SHIP CODE	124	A2	Ship Code (listed in Table 1.).
REC_IND	126	A1	'@'

### DATA

Element	Start Position	Field Type	Description of Field
STATION NO	1	A3,I3	Station number given by the ship code suffixed with three digits consecutive numbers.
DATE/TIME	8	2(2I2,1X)	Month, day and time of an observation in JST.
LATITUDE	18	I2,1X,I2,I1,A1	Degrees, minutes and tenths of minutes (if given) of latitude, N or S.
LONGITUDE	26	I3,1X,I2,I1,A1	Degrees, minutes and tenths of minutes (if given) of longitude, E or W.
TEMP 0 (500)	35	F4.1	Temperature determined with a "bathythermograph" at each depths in degrees centigrade.
10 (550)	40	F4.1	
20 (600)	45	F4.1	
30 (650)	50	F4.1	
50 (700)	55	F4.1	
75 (750)	60	F4.1	
100 (800)	65	F4.1	
150 (900)	70	F4.1	
200(1000)	75	F4.1	
250(1200)	80	F4.1	
300(1400)	85	F4.1	
350(1600)	90	F4.1	
400(1800)	95	F4.1	

Element	Start Position	Field Type	Description of Field
450(2000)	100	F4.1	
SURF-SAL	105	F6.3	Surface salinity in PSS-78.
ACM-NO	112	A3,I3	Corresponding station number of the subsurface current data.
PROBE TYPE	119	I3	Probe code, WMO code table 1770 (Table 2).
INST. TYPE	122	I2	Instrument code, WMO code table 4770 (Table 3).
TYP	125	A1	Type of "bathythermograph"(BT): (X: expendable BT, D: Digital BT.)
REC_IND	126	A1	'@' or '='

### 3 Subsurface current data

The file structure of subsurface current data is the same as the subsurface temperature data.

#### HEADER (Cruise Information)

Element	Start Position	Field Type	Description of Field
FORMAT CODE	1	A4	Format code of the file: 'A1.1'
CRUISE NO	6	I4	Cruise number identified with the year and the month.
PERIOD	11	2(2I2,1X)	Date of beginning and end of the subsurface current observations.
AREA	21	A98	Observation area.
NO OF STN	119	I4	Number of stations.
SHIP CODE	124	A2	Ship Code (listed in Table 1.).
REC_IND	126	A1	'@'

#### DATA

Element	Start Position	Field Type	Description of Field
STATION NO	1	A3,I3	Station number given by the ship code suffixed with three digits consecutive numbers.
DATE/TIME	8	2(2I2,1X)	Month, day and time of an observation in JST.
LATITUDE	18	I2,1X,I2,I1,A1	Degrees, minutes and tenths of minutes (if given) of latitude, N or S.
LONGITUDE	26	I3,1X,I2,I1,A1	Degrees, minutes and tenths of minutes (if given) of longitude, E or W.
W-DEPTH	35	I4	Water depth to the bottom in meters.
NO OF LAYER	40	I2	Number of observation layers.
DEPTH(1)	43	I4	Depth of the 1st(4th) layer in meters.

Element	Start Position	Field Type	Description of Field
DIR/SPEED(1)	48	I3,1X,I2	True direction(in degrees) toward which current is flowing and speed given in tenths of knots of the subsurface current for the 1st (4th) layer determined with Acoustic Doppler Current Meter (ACM). When the speed is less than 0.05knots, direction is given as 0.
DEPTH(2)	55	I4	Same as above but for the 2nd (5th) layer.
DIR/SPEED(2)	60	I3,1X,I2	idem
DEPTH(3)	67	I4	Same as above but for the 3rd (6th) layer.
DIR/SPEED(3)	72	I3,1X,I2	idem
REF	79	A2	Method to determine the ship velocity, which is used to calculate the absolute current velocity. (LC: Loran-C, GP: GPS, BM: Bottom track by ACM.)
SURF-TEMP	82	F5.2 or F4.1,1X	Surface temperature in ITS-90.
SURF-SAL	88	F6.3	Surface salinity in PSS-78.
HYD-NO	95	I4	Corresponding station number of hydrographic data.
SSF-NO	99	A2,I3	Corresponding station number of subsurface temperature data.
INTERVAL	105	I4	Time of averaging interval in seconds.
SHIP-DIR	110	I3	Direction of the ship in degrees.
SHIP-SPD	114	I3	Speed of the ship in tenths of knots.
HEAD	118	I3	Heading of the ship from gyro in degrees.
PING NO	122	I4	Number of pings over the averaging period.
REC_IND	126	A1	'@' or '='

#### 4 Plankton data

Element	Start Position	Field Type	Description of Field
STATION NO	1	A2,I4	Station number given by the ship code suffixed with four digits consecutive numbers.
SUB STN NO	8	A5	Sub station number.
LATITUDE	14	I2,1X,I2	Degrees, minutes of latitude.
LONGITUDE	20	I3,1X,I2	Degrees, minutes of longitude.
DATE/TIME	27	2(I2,1X),2I2	Month, day and time of an observation in JST.
DEPTH	38	A6	Range of towed depths in meters.
WATER STRAINED	45	F5.1	Amount of water in cubic meters as determined by the flow meter.
WET WEIGHT	51	I5	Wet weight given in milligrams per cubic meters.
NAME CODE	61	I5	Name code defined by JODC (listed in Table 4).

Element	Start Position	Field Type	Description of Field
NUMBER	67	I7	Total numbers per liter (phytoplankton) or per ten cubic meters (zooplankton).

Note: Type of the net used to collect the zooplankton is Norpac net (Diameter: 45cm, Length: 180cm, Filtering part: Bolting cloth GG54).

## 5 CTD data

CTD data files consist of header part (first 9 records) and data part. The following elements are separated by comma in each record. An example of CTD data file is shown in page 87.

### (a) Header part

Record information	
Record No.	Element
Rec-1	Ship name (listed in Table 1), cruise number and format code. Cruise number is identified with the year and the month. Format code is 'R2.1'.
Rec-2	Station number and cast number. Station number is given by the ship code (listed in Table 1) suffixed with four digits.
Rec-3	The number of data records.
Rec-4	Date (year/month/day) and time at the bottom of the hydrographic cast in the Japan Standard Time (JST), which is nine hours ahead of the Coordinated Universal Time (UTC).
Rec-5	Latitude and longitude at the bottom of the hydrographic cast with degrees, '-', minutes, '.', hundredth part of minutes.
Rec-6	Water depth at the bottom of the hydrographic cast and sounding flag (listed in Table 5).
Rec-7	Corresponding station number of the subsurface current data and sub-station number.
Rec-8	Headers for data columns.
Rec-9	Units for data columns.

### (b) Data part

Data are described at every  $1 \times 10^4$  Pa. The meaning of attached flags is shown in Table 6.

Record information	
Record No.	Elements
below Rec-10	Pressure, Temperature, Salinity, Dissolved oxygen with each flag (listed in Table 6) and the number of data used for averaging.

## 6 XCTD data

XCTD data files consist of header part (first 14 records) and data part. The following elements are separated by comma in each record. An example of XCTD data file is shown in page 88.

### (a) Header part

Record information	
Record No.	Element
Rec-1	Ship name (listed in Table 1), cruise number and format code. Cruise number is identified with the year and the month. Format code is 'X1.1'.
Rec-2	Station number. Station number is given by the ship code (listed in Table 1) suffixed with four-digits consecutive numbers.
Rec-3	The number of data records.
Rec-4	Date (year/month/day) and time at the beginning of the expendable CTD observation in the Japan Standard Time (JST), which is nine hours ahead of the coordinated Universal Time (UTC).
Rec-5	Latitude and longitude at the beginning of the expendable CTD observation with degrees, '-', minutes, '.', hundredth part of minutes.
Rec-6	Water depth at the beginning of the expendable CTD observation and sounding flag (listed in Table 5).
Rec-7	Corresponding station number of the subsurface current data and sub-station number.
Rec-8	Sea surface temperature and salinity.
Rec-9	Probe type and instrument serial number.
Rec-10	Coefficients of the depth-time equation.
Rec-11	Correction coefficient of water temperature sensor.
Rec-12	Correction coefficient of electric conductivity sensor.
Rec-13, Rec-14	Headers for data columns.

### (b) Data part

Data are described at every 1 meter. The meaning of attached flags is shown in Table 6.

Record information	
Record No.	Elements
below Rec-15	Depth, Temperature, flag of temperature, Salinity and flag of salinity (listed in Table 6).



## 7 BT data

BT data files consist of header part (first 11 records) and data part. The following elements are separated by comma in each record. An example of BT data file is shown in page 89.

### (a) Header part

Record information	
Record No.	Element
Rec-1	Ship name (listed in Table 1), cruise number and format code. Cruise number is identified with the year and the month. Format code is 'V2.1'.
Rec-2	Station number. Station number is given by the BT code (listed in Table 1) suffixed with three digits consecutive numbers.
Rec-3	The number of data records.
Rec-4	Date (year/month/day) and time at the beginning of the bathythermograph (BT) observation in the Japan Standard Time (JST), which is nine hours ahead of the coordinated Universal Time (UTC).
Rec-5	Latitude and longitude at the beginning of the bathythermograph (BT) observation with degrees, '-', minutes, '.', hundredth part of minutes.
Rec-6	Water depth at the beginning of the bathythermograph (BT) observation and sounding flag (listed in Table 5).
Rec-7	Corresponding station number of the subsurface current data and sub-station number.
Rec-8	Sea surface temperature and salinity.
Rec-9	Type of "bathythermograph (BT)" ; (X-BT: expendable BT, D-BT: Digital BT.).
Rec-10 for X-BT	Probe type and probe serial number.
Rec-11 for X-BT	Coefficients of the depth-time equation (listed in Table 2).
Rec-10, Rec-11 for D-BT	Headers for data columns.
Rec-12, Rec-13 for X-BT	Headers for data columns.

### (b) Data part

Data are described at every 1 meter. The meaning of attached flags is shown in Table 6.

Record information	
Record No.	Elements
below Rec-12	Depth, Temperature and flag of temperature (listed in Table 6).
(Rec-14 for X-BT)	

## 8 Maritime meteorological data

Maritime meteorological data layout is identical to the International Maritime Meteorological Tape (IMMT) [VERSION IMMT-1]. All the description of WMO code tables used in the format are contained in the CD-ROM.

Element	Start Position	Field Type	Description of Field
TEMP INDICATOR	1	I1	IMMT format with temperatures in tenths of degrees Celsius: '3'
YEAR	2	I4	Year in UTC
MONTH	6	I2	Month in UTC
DAY	8	I2	Day in UTC
OBSERVATION TIME	10	I2	Nearest whole hour in UTC
QUADRANT OF THE GLOBE	12	I1	Quadrant of the Globe, WMO code table 3333: '1' for North Latitude and East Longitude; '3' for South Latitude and East Longitude; '5' for South Latitude and West Longitude; '7' for North Latitude and West Longitude.
LATITUDE	13	I3	Latitude in tenths of degree
LONGITUDE	16	I4	Longitude in tenths of degree
CLOUD HEIGHT AND VISIBILITY INDICATOR	20	I1	'0' for cloud height and visibility estimated; '1' for cloud height measured, visibility estimated; '2' for cloud height and visibility measured; '3' for cloud height estimated, visibility measured.
CLOUD HEIGHT	21	I1	height of the base of the lowest cloud, WMO code table 1600.
VISIBILITY	22	I2	Visibility, WMO code table 4377.
CLOUD AMOUNT	24	I1	Total cloud cover in oktas, WMO code table 2700.
WIND DIRECTION	25	I2	True wind direction in tens of degrees, WMO code table 0877.
WIND SPEED INDICATOR	27	I1	The wind speed was measured with an anemometer in knots: '4'
WIND SPEED	28	I2	True wind speed in knots
TEMPERATURE INDICATOR	30	I1	The sign of the air temperature: '0' for the positive or zero temperatures; '1' for negative.
AIR TEMPERATURE	31	I3	Air temperature in tenths of degrees Celsius
DEW POINT TEMPERATURE INDICATOR	34	I1	The sign of the dew point temperature: '0' for the positive or zero temperatures; '1' for negative.
DEW POINT TEMPERATURE	35	I3	Dew point temperature in tenths of degrees Celsius
PRESSURE	38	I4	Air pressure in tenths of hectopascals
PRESENT WEATHER	42	I2	Present weather, WMO code table 4677
PAST WEATHER 1	44	I1	Past weather, WMO code table 4561
PAST WEATHER 2	45	I1	Past weather, WMO code table 4561

(continued)

Element	Start Position	Field Type	Description of Field
LOWEST CLOUD AMOUNT	46	I1	Amount of lowest clouds in oktas, WMO code table 2700
LOW CLOUD TYPE	47	I1	WMO code table 0513
MIDDLE CLOUD TYPE	48	I1	WMO code table 0515
HIGH CLOUD TYPE	49	I1	WMO code table 0509
SEA SURFACE TEMPERATURE INDICATOR	50	I1	The sign of the sea surface temperature: '0' for positive or zero temperatures; '1' for negative.
SEA SURFACE TEMPERATURE	51	I3	Sea surface temperature in tenths of degrees Celsius
SEA SURFACE TEMPERATURE MEASUREMENT	54	I1	Indicator for sea surface temperature measurement: '0' for bucket thermometer; '1' for condenser inlet.
WAVE MEASUREMENT	55	I1	'0' for wind wave and swell estimated.
WIND WAVE PERIOD	56	I2	Period of wind waves in seconds.
WIND WAVE HEIGHT	58	I2	Height of wind waves in units of 0.5 m.
SWELL DIRECTION	60	I2	Direction of predominant swell waves in tens of degrees, WMO code table 0877
SWELL PERIOD	62	I2	Period of predominant swell waves in seconds.
SWELL HEIGHT	64	I2	Height of predominant swell waves in unit of 0.5m.
ICE ACCRETION	66	I1	Cause of ice accretion on ship, WMO code table 1751
ICE THICKNESS	67	I2	Thickness of ice accretion on ship in centimeters
ICE ACCRETION RATE	69	I1	Rate of ice accretion on ship, WMO code table 3551
OBSERVATION SOURCE	70	I1	'1' for national logbook
PLATFORM	71	I1	'1' for selected ship
CALL SIGN	72	A7	Ship's call sign (listed in Table 1).
COUNTRY	79	I2	'17' for Japan
QUALITY CONTROL INDICATOR	82	I1	'6' for manual and automated quality control (intensive)
WEATHER DATA INDICATOR	83	I1	'1' for manual
PRECIPITATION INDICATOR	84	I1	Indicator for inclusion or omission of precipitation data, WMO code table 1819
PRECIPITATION AMOUNT	85	I3	Amount of precipitation, WMO code table 3590
PRECIPITATION DURATION	88	I1	Duration of period of reference for amount of precipitation, WMO code table 4019
PRESSURE TENDENCY CHARACTERISTIC	93	I1	Characteristic of pressure tendency during the three hours preceding the time of observation, WMO code table 0200

(continued)

Element	Start Position	Field Type	Description of Field
PRESSURE TENDENCY AMOUNT	94	I3	Amount of pressure tendency during the three hours preceding the time of observation in tenths of hectopascal
SHIP COURSE	97	I1	True direction of resultant displacement of the ship during three hours preceding the time of observation, WMO code table 0700
SHIP SPEED	98	I1	Ship's average speed made good during three hours preceding the time of observation, WMO code table 4451
2ND SWELL DIRECTION	99	I2	Direction of secondary swell waves in tens of degrees
2ND SWELL PERIOD	101	I2	Period of secondary swell waves in seconds
2ND SWELL HEIGHT	103	I2	Height of secondary swell waves in units of 0.5 m
SEA ICE CONCENTRATION	105	I1	Concentration or arrangement of sea ice, WMO code table 0639
SEA ICE DEVELOPMENT	106	I1	Stage of development of sea ice, WMO code table 3739
LAND ORIGIN ICE	107	I1	Ice of land origin, WMO code table 0439
ICE EDGE BEARING	108	I1	True bearing of principal sea ice edge, WMO code table 0739
ICE CONDITION	109	I1	Present sea ice situation and trend of conditions over preceding three hours, WMO code table 5239
FM 13 VERSION	110	I1	'8' for FM 13-X
IMMT VERSION	111	I1	'1' for IMMT-1
CLOUD HEIGHT QC INDICATOR	112	I1	'1' -- quality control has been performed; element appears to be correct
VISIBILITY QC	113	I1	idem
CLOUD AMOUNT AND TYPE QC	114	I1	idem
WIND DIRECTION QC	115	I1	idem
WIND SPEED QC	116	I1	idem
AIR TEMPERATURE QC	117	I1	idem
DEW POINT QC	118	I1	idem
AIR PRESSURE QC	119	I1	idem
WEATHER QC	120	I1	idem
SEA SURFACE TEMPERATURE QC	121	I1	idem
WIND WAVE PERIOD QC	122	I1	idem
WIND WAVE HEIGHT QC	123	I1	idem
SWELL QC	124	I1	idem
PRECIPITATION QC	125	I1	idem

(continued)

Element	Start Position	Field Type	Description of Field
PRESSURE TENDENCY CHARACTERISTIC QC	126	I1	idem
PRESSURE TENDENCY AMOUNT	127	I1	idem
SHIP DIRECTION QC	128	I1	idem
SHIP SPEED QC	129	I1	idem
SHIP POSITION QC	131	I1	idem

## 9 Aerological data

Aerological data files are composed of all the station data groups on the same date in UTC. The station data groups are composed of HEADER-1, HEADER-2 and DATA.

HEADER-1 and HEADER-2 represent an observation declaration and station information, respectively. DATA includes observation data at the station. The character '63' on the "LEVEL INDICATOR" of DATA represents the end record of each station data group. An example of Aerological data file is shown in page 90.

### HEADER-1 (Observation declaration)

Element	Start Position	Field Type	Description of Field
DECLARATION	1	A4	'AERO'

### HEADER-2 (Station information)

Element	Start Position	Field Type	Description of Field
AERO_CODE	3	A11	Ship's code (listed in Table 1)
LATITUDE	16	I5	Latitude in hundredths of degrees (positive for North and negative for South Latitude)
LONGITUDE	22	I6	Longitude in hundredths of degrees (positive for East and negative for West Longitude)
LAUNCHER HEIGHT	29	I4	Height of launcher in meters.
YEAR	34	I4	Year in UTC (last two or four digit)
MONTH	39	I2	Month in UTC
DAY	42	I2	Day in UTC
HOURL	46	I2	Hour in UTC of sonde launch time
MINUTE	49	I2	Minute in UTC of sonde launch time
SENSOR S/N	52	I9	Sonde sensor serial number

DATA (Observation data)

Element	Start Position	Field Type	Description of Field
LEVEL INDICATOR	1	I2	Standard pressure level and significant level indicator (listed in Table 7):
PRESSURE	5	I5	Pressure in tenths of hectopascals
HEIGHT	12	I5	Height in meters
TEMPERATURE	19	I5	Temperature in tenths of degrees Celsius
HUMIDITY	26	I3	Relative humidity in %
WIND DIRECTION	32	I3	Wind direction in degrees
WIND SPEED	37	I4	Wind speed in the units of 0.1 m/s

Table 1: Ship codes.

Ship Name	CALL SIGN	Ship Code	BT Code	AERO_CODE
Kofu Maru	JDWX	KH	th	1 2 47 002
Ryofu Maru	JGQH	RF	tf	1 2 47 646
Keifu Maru	JPBN	KS	ts	1 2 47 000
Chofu Maru	JCCX	NC	tc	1 2 47 001
Seifu Maru	JIVB	SM	tm	1 2 47 003

Table 2: Probe code and coefficients of the depth-time equation in Subsurface temperature data. The depth-time equation is of the form:

$$z_m = a_m * t + b_m * t^2$$

where  $z_m$  is the depth and  $t$  is the elapsed time in seconds starting when the probe hits the surface;  $a_m$  and  $b_m$  are positive constants.

Code	Manufacturer	Probe Type	coefficients	
			$a_m$	$b_m$
212	Tsurumi Seiki Co.	T-6	6.691	-0.00225
222	Tsurumi Seiki Co.	T-7	6.691	-0.00225
231	Tsurumi Seiki Co.	T-5	6.828	-0.00182
252	Tsurumi Seiki Co.	Deep Blue	6.691	-0.00225

Table 3: Instrument codes for observation using expendable probe in Subsurface temperature data.

Code	Instrument
32	Murayama Denki Z-60-16-III
33	Murayama Denki Z-60-16-II
45	Tsurumi Seiki Co. MK-100
46	Tsurumi Seiki Co. MK-130 Compatible recorder

Table 4: Name codes of plankton in Plankton data.

Code	Name
00099	<i>BACILLARIOPHYCEAE</i>
01327	<i>SAGITTOIDEA</i>

Table 5: Sounding flag of water depth in CTD, XCTD and BT data.

Flag No.	Definition
1	Sounding by echo-sounder (not corrected)
2	Sounding by echo-sounder (corrected)
5	Water depth measured by CTD and altimeter
6	Water depth measured by BT or XCTD submersible
9	No sounding

Table 6: Data flag in CTD, XCTD and BT data.

Flag No.	Definition
2	Good
3	Doubtful
4	Bad
6	Interpolation by the separated layer over $2 \times 10^4 \text{Pa}$
7	Spike corrected
9	No data

Table 7: Aerological level indicator.

Code	Definition
01	Significant level for temperature and/or humidity
02	Standard pressure level
05	Tropopause
16	Significant level for wind direction/speed
17	Significant level for temperature/humidity and wind
24	Wind speed maximum
63	End record

## Part-2. Summary of Coastal Water Temperature Observations

The Japan Meteorological Agency (JMA) has carried out water temperature observations at stations along the Japanese coast. Table 8 shows names, positions and observation periods of the 21 stations whose data are available in this CD-ROM.

The coastal water temperature had been measured at 10:00 JST (Japan Standard Time) every day with a mercury thermometer until 1970/80s. In 1970/80s, self-recording apparatus with resistance thermometer were introduced at the stations except Sakata in the months shown in Table 8. JMA discontinued the observation in November 1993 at Naze and in March 1995 at other 13 stations. Since April 1995, the coastal water temperature has been observed at 7 stations: Esashi, Miyako, Onahama, Omaezaki, Hachijojima, Hamada and Ishigaki. Hourly sampling has been made at the 7 stations since March 1996. The observation at Hachijojima has been suspended since October 2002 due to trouble with the sensor and transmitter.

The coastal water temperature data are provided in the files named COAST02J, COAST02D, and COAST02H.nnn, where nnn is the last 3 figures of WMO station index.

COAST02J contains historical time series of 10-day and monthly mean values at the 21 stations during the period shown in Table 8. The file consists of half-yearly records which include the first 10-day mean, the second 10-day mean, the last 10-day mean, and the monthly mean in the former or latter half of the year. The records also include WMO station index, year and period indicator: "A" or "B", which indicates the former or latter half of the year. 10-day or monthly mean value is specified as "999" in case of more than 20% of the data are missing during the period. The format is shown in Table 10.

COAST02D contains daily observed temperatures at 10:00 JST at the 21 stations during the period shown in Table 9. The file consists of monthly records which include daily observed temperatures in the month, WMO station index, year and month. The format is shown in Table 11.

COAST02H.nnn contains hourly observed temperatures at each station for the period from March 1996 to December 2002. Each file consists of daily records which contain the temperatures observed every hour from 01 to 24 JST in the day, WMO station index, year, month and day. The format is shown in Table 12.

Table 8: List of stations in the file COAST02J and related information.

Station	WMO station index	Position Lat. Lon.	COAST02J Data are available from	Introduction of the resistance thermometer	COAST02J Data are available to
WAKKANAI	47401	45-25N 141-41E	Sep.1938	Feb.1981	Mar.1995
SUTTSU	47421	42-48N 140-14E	Jan.1908	Mar.1984	Mar.1995
URAKAWA	47426	42-10N 142-47E	Nov.1940	Oct.1980	Mar.1995
ESASHI	47428	41-52N 140-08E	Jan.1941	Apr.1984	Dec.2002
MOMBETSU	47435	44-21N 143-22E	Jan.1957	Jul.1983	Mar.1995
MIYAKO	47585	39-39N 141-58E	Sep.1927	Nov.1978	Dec.2002
SAKATA (TOBISHIMA)	47587	38-54N 139-51E	Jan.1934	-	Mar.1995
ONAHAMA	47598	36-57N 140-54E	Jan.1936	Jun.1976	Dec.2002
WAJIMA	47600	37-23N 136-54E	Jan.1932	Feb.1978	Mar.1995



Station	WMO station index	Position Lat. Lon.		Data are available from	Introduction of the resistance thermometer	Data are available to
OMAEZAKI TATEYAMA (MERA)	47655	34-36N	138-13E	May 1934	Aug.1983	Dec.2002
HACHIJOJIMA	47672	34-59N	139-52E	Aug.1982	Aug.1982	Mar.1995
SAIGO	47678	33-06N	139-47E	Jan.1936	Aug.1972	Sep.2002
HAMADA	47740	36-12N	133-20E	Nov.1939	Jul.1983	Mar.1995
SHIONOMISAKI	47755	34-54N	132-04E	Dec.1941	Jul.1985	Dec.2002
SHIMIZU (ASHIZURI)	47778	33-27N	135-46E	Jan.1939	Jul.1982	Mar.1995
IZUHARA	47898	32-43N	133-01E	Jan.1946	Jul.1983	Mar.1995
USHIBUKA	47800	34-12N	129-18E	Jan.1934	Aug.1986	Mar.1995
NAZE	47838	32-12N	130-02E	Jun.1955	Jun.1985	Mar.1995
ISHIGAKI	47909	28-23N	129-30E	Jan.1939	Jul.1984	Nov.1993
NAHA	47918	24-20N	124-10E	Jan.1914	Sep.1981	Dec.2002
	47936	26-12N	127-41E	Jan.1936	Jul.1982	Mar.1995

Table 9: Data available periods of COAST02D and COAST02H.nnn.

Station	COAST02D		COAST02H.nnn	
	Data are available from	to	Data are available from	to
WAKKANAI	Feb.1981	Mar.1995	-	-
SUTTSU	Mar.1984	Mar.1995	-	-
URAKAWA	Oct.1980	Mar.1995	-	-
ESASHI	Apr.1984	Dec.2002	Mar.1996	Dec.2002
MOMBETSU	Jul.1983	Mar.1995	-	-
MIYAKO	Nov.1978	Dec.2002	Mar.1996	Dec.2002
SAKATA(TOBISHIMA)	Jan.1961	Mar.1995	-	-
ONAHAMA	May.1976	Dec.2002	Mar.1996	Dec.2002
WAJIMA	Jan.1961	Mar.1995	-	-
OMAEZAKI	Jan.1961	Dec.2002	Mar.1996	Dec.2002
TATEYAMA(MERA)	Aug.1982	Mar.1995	-	-
HACHIJOJIMA	Jan.1961	Sep.2002	Mar.1996	Sep.2002
SAIGO	Jul.1983	Mar.1995	-	-
HAMADA	Jul.1985	Dec.2002	Mar.1996	Dec.2002
SHIONOMISAKI	Jul.1982	Mar.1995	-	-
SHIMIZU(ASHIZURI)	Jan.1961	Mar.1995	-	-
IZUHARA	Aug.1986	Mar.1995	-	-
USHIBUKA	Jun.1985	Mar.1995	-	-
NAZE	Jul.1984	Nov.1993	-	-
ISHIGAKI	Jan.1961	Dec.2002	Mar.1996	Dec.2002
NAHA	Jul.1982	Mar.1995	-	-

Table 10: Record format of COAST02J

Element	Start Position	Field Type	Description of Field
10-DAY AND MONTHLY MEAN WATER TEMPERATURE	1	6(4I3)	unit: 0.1 degrees centigrade. 999: no data. Six consecutive monthly sets of 1st, 2nd and 3rd 10-day means and monthly mean.
STATION INDEX	73	I3	The last three figures of WMO station index number.
YEAR	76	I4	
PERIOD	80	A1	"A" means former half of the year.
INDICATOR			"B" means latter half of the year.

Table 11: Record format of COAST02D

Element	Start Position	Field Type	Description of Field
STATION INDEX	1	I5	WMO station index number.
YEAR AND MONTH	6	I4,I2	
WATER TEMPERATURE	12	31(I3)	unit: 0.1 degrees centigrade. 999: no data. 31 consecutive daily observed temperatures.

Table 12: Record format of COAST02H.nnn  
( nnn: Last 3 figures of WMO station index number )

Element	Start Position	Field Type	Description of Field
STATION INDEX	1	I5	WMO station index number.
YEAR AND MONTH	7	I4,1X,I2	
DAY	15	I2	
WATER TEMPERATURE	18	24(I3,1X)	unit: 0.1 degrees centigrade. 999: no data. 24 consecutive hourly observed temperatures.

### Part-3. Summary of Ocean Data Buoy Observations

The JMA has been operating drifting ocean data buoys. The buoys have cylindrical shape hull with a diameter of 64 centimeters. Sensors for position, air pressure, sea surface temperature and wave height/period are equipped within the hull, at levels close to the sea surface. The observation is usually carried out every three hours. When wave height exceeds the threshold set beforehand (e.g. 3.0 m), each buoy changes the function automatically to one-hourly observation. The threshold value can be changed anytime via two-way satellite telecommunication system. Observation data of each buoy are stored on the CD-ROM in a file named "yy-nn.txt", while the chart is stored in a file named "yy-nn.gif". Where yy shows year and nn is a consecutive number assigned in order of deployment in the year.

Table 13: File format of Drifting ocean data buoys

Element	Start Position	Field Type	Description of Field
Buoy number	1	I5	WMO station index number.
Year	7	I4	
Month	12	I2	
Day	15	I2	
Hour	18	I2	The Coordinated Universal Time.
Latitude			
N or S	21	A1	N:North,S:South.
Degrees	23	I5	Latitude in degrees to thousandths.
Longitude			
E or W	29	A1	E:East,W:West.
Degrees	30	I6	Longitude in degrees to thousandths.
Air pressure	37	I5	Air pressure in hPa to tenths.
Sea surface temp.	43	I3	Sea surface temperature in degrees centigrade to tenths.
Wave height	47	I3	Significant wave height in meter to tenths.
Wave period	51	I2	Significant wave period in seconds.